National Institute of Environmental Health Sciences

Influenza virus transmission is dependent on relative humidity and temperature

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Abstract:

Using the guinea pig as a model host, we show that aerosol spread of influenza virus is dependent upon both ambient relative humidity and temperature. Twenty experiments performed at relative humidities from 20% to 80% and 5 degrees C, 20 degrees C, or 30 degrees C indicated that both cold and dry conditions favor transmission. The relationship between transmission via aerosols and relative humidity at 20 degrees C is similar to that previously reported for the stability of influenza viruses (except at high relative humidity, 80%), implying that the effects of humidity act largely at the level of the virus particle. For infected guinea pigs housed at 5 degrees C, the duration of peak shedding was approximately 40 h longer than that of animals housed at 20 degrees C; this increased shedding likely accounts for the enhanced transmission seen at 5 degrees C. To investigate the mechanism permitting prolonged viral growth, expression levels in the upper respiratory tract of several innate immune mediators were determined. Innate responses proved to be comparable between animals housed at 5 degrees C and 20 degrees C, suggesting that cold temperature (5 degrees C) does not impair the innate immune response in this system. Although the seasonal epidemiology of influenza is well characterized, the underlying reasons for predominant wintertime spread are not clear. We provide direct, experimental evidence to support the role of weather conditions in the dynamics of influenza and thereby address a long-standing question fundamental to the understanding of influenza epidemiology and evolution.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2034399

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Meteorological Factors, Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Airborne Disease

Airborne Disease: Influenza

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified